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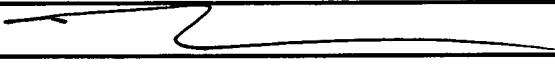
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First Named Inventor	Ambrogi et al.
Art Unit	Unknown
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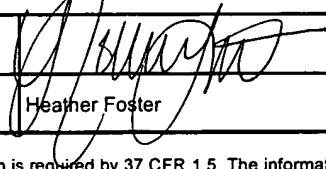
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### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Bell, Boyd & Lloyd LLC		
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Printed name	Robert M. Barrett		
Date	February 27, 2007	Reg. No.	30,142

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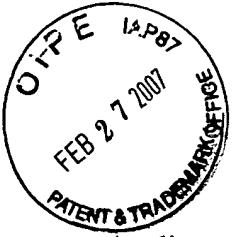
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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicants: Ambrogi et al.  
Appl. No.: 11/598,444  
Filed: August 30, 2006  
Conf. No.: 5263  
Title: FROZEN AERATED CONFECTION AND METHOD OF PRODUCTION  
Art Unit: Unknown  
Examiner: Unknown  
Docket No.: 112701-750

Mail Stop  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**SUBMISSION OF CERTIFIED COPY OF PRIORITY DOCUMENT**

Applicants are respectfully enclosing the certified copy of the priority document for which priority is claimed for the above-identified application under 35 U.S.C. §119. Specifically, the document enclosed is:

<b>Document No.</b>	<b>Country</b>	<b>Date</b>
04004755.7	Europe	March 1, 2004

The Commissioner is hereby authorized to charge deposit account 02-1818 for any fees which are due and owing.

Respectfully submitted,

BELL, BOYD & LLOYD LLC

BY \_\_\_\_\_

Robert M. Barrett  
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Dated: February 27, 2007

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Attestation

Die angehefteten Unterlagen stimmen mit der ursprünglich eingereichten Fassung der auf dem nächsten Blatt bezeichneten europäischen Patentanmeldung überein.

The attached documents are exact copies of the European patent application described on the following page, as originally filed.

Les documents fixés à cette attestation sont conformes à la version initialement déposée de la demande de brevet européen spécifiée à la page suivante.

Patentanmeldung Nr.    Patent application No.    Demande de brevet n°

04004755.7

Der Präsident des Europäischen Patentamts;  
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets  
p.o.

R C van Dijk

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Anmeldung Nr:  
Application no.: 04004755.7  
Demande no:

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Date of filing: 01.03.04  
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Anmelder/Applicant(s)/Demandeur(s):

NESTEC S.A.  
Avenue Nestlé 55  
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SUISSE

Bezeichnung der Erfindung/Title of the invention/Titre de l'invention:  
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.  
If no title is shown please refer to the description.  
Si aucun titre n'est indiqué se referer à la description.)

Frozen confection and method of production

In Anspruch genommene Priorität(en) / Priority(ies) claimed /Priorité(s)  
revendiquée(s)  
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## Frozen aerated confection and method of production

### 5 Pied of the invention

The present invention is related to a frozen aerated packaged ice confection with very high softness at - 18° C and which keeps this property without shrinkage or layering up to the final consumer over the product shelf life.

### 10 Background of the invention

There is a problem in achieving stability of a very soft ice cream packed in cups or bulk containers.

15 Inside the ice cream there are ice crystals and air bubbles dispersed in a liquid phase. Softness generally is obtained by reducing the quantity of ice formed and this is mainly obtained by selecting the type and the amount of sugars, by adding salt or alkohol in the ice cream mix. There is some limitation in the possibilities to play with the low molecular components mentioned above for taste reasons.

20 Thus, if further increase of softness is targeted, the only possibility is to use polyols, e.g. glycerol which increases the risk of shrinkage. Shrinkage is a serious problem which makes the product unacceptable to the consumer: the volume of the ice cream shrinks, leaving a space either at the top or at the side of the package, which then appears unfull.

25 Unfortunately, the problem of instability raises with the volume of the liquid phase. Without willing to be bound by theory, when the volume of the liquid phase raises, the air bubbles have a tendency to go up which may lead to the formation of a layer of ice at the bottom of the container: this default is called layering.

30 In WO 01/06865 a solution to the problem of improved texture and stability of soft serve ice cream, in particular resistance to heat shock is obtained by creating fine and stable air cells with the aid of a specific blend of emulsifiers comprising propylene glycol monostearate, sorbitan tristearate and unsaturated monoglycerides.

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EP-A-1 321 043 relates to a frozen aerated ice cream which has a soft structure at - 18° C, contains high amounts of freezing point depressing sugars and contains less than 0.5 % by weight glycerol. Since it is for use with soft serve ice dispensing devices which comprise extrusion of cartridges containing the soft ice cream on the place of consumption, shrinkage is not an issue since the consumer would not notice it.

The purpose of the invention is to achieve stabilization of soft serve ice cream type of product for home use with high resistance to shrinkage and layering.

10

#### Summary of the invention

The present invention thus concerns an aerated frozen confection which is resistant to shrinkage and is soft up to common storage temperature, characterized in that it comprises by weight:

15

50 to 70 % water,

5 to 20 % fat,

1 % or more polyol,

0.5 to 7 % vegetable fibre,

the balance being sugars, milk proteins, hydrocolloids and emulsifiers and has an overrun of 20 to 200 %.

Preferably, the product of the invention contains 2 to 8 % by weight proteins. Preferably the proteins are of milk origin and come from liquid skimmed milk, skimmed milk powder and whey powder, optionally recombined in water.

25

Preferably, the protein source should undergo only one pasteurisation step in order to minimize thermal denaturation of proteins. Thus milk solid non fat aid in providing the desirable properties of whipability, smoothness, body and melt resistance.

30

In the context of the invention, a suitable polyol can be selected from the group consisting of sorbitol, mannitol, lactitol, xylitol, maltitol and glycerol, glycerol being preferred. The role of polyol is to further soften the frozen confection by making it sufficiently soft to be scoopable at home freezer temperature of - 18° C or less. It is used to increase softness because it reduces ice content with less sweetening effect than sucrose.

35

Preferably, glycerol is used at a level of 1 to 5 % by weight.

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Vegetable fibres which are contemplated in the invention can preferably be selected from the group consisting of oat fibres, fibres extracted from chicory taproots and fibregum from Acacia tree. Preferably they consist in fructo-  
5 oligosaccharides, most preferably they are inulin-oligofructoses extracted from chicory. Most preferably, inulin-oligofructoses are used at a level of 2 to 4 % by weight. We have found that it has a strong effect to prevent shrinkage and ice layering, also in the presence of glycerol.

10 Preferably, the product of the invention comprises sweetener ingredients which are a combination of sucrose, dextrose and glucose syrup, preferably from corn syrup solids, that provide a desired level of sweetness and texture and decrease the freezing point of the mixture.

15 The fat may be of milk or vegetable origin and its level may be within a broad range. If less fat is used in combination with a polyol and vegetable fibre, it is then possible to manufacture a cheaper ice cream or an ice cream which is more dietetic with the same softness as a regular high fat ice cream .

20 Another advantage achieved by the invention is that live probiotic lactic acid bacteria, can be incorporated, e.g. in encapsulated form or in the form of separately cultured portion of the milk solid non fat which is added to the mix, in this latter case after pasteurisation. These probiotic bacteria can thus act in combination with the fermentescible prebiotic vegetable fibres to provide upon  
25 consumption a beneficial positive influence on the development of the intestinal flora with the consumer.

The invention further concerns a method for producing an aerated frozen confection as described above, characterized in that it comprises the steps of premixing vegetable fibre with water and adding the other powdery and liquid ingredients in an agitated mixing tank,  
30 subjecting the mix to a heating step to hydrate the hydrocolloids,  
pasteurising the heated mix,  
homogenising the pasteurised mix,  
35 cooling, ageing and freezing the mix whilst aerating,  
packaging and hardening the mix.

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Preferably, the freezing step is carried out in a scraped surface freezer at a draw temperarure at the freezer outlet of - 5 to - 10° , most preferably at a draw temperature as low as possible of about - 9 t o - 10° C.

5

The invention finally also concerns the use of vegetable fibre in combination with a polyol for improving softness and stability against shrinkage of an ice confection which contains 5 to 20 % by weight fat.

10 Detailed description of the invention

The present invention will be further illustrated in the following examples wherein, unless indicated otherwise, the percentages are by weight.

15 The softness character in the context of the invention is determined according to the following test:

The force is measured to vertically penetrate a spoon 1 cm deep into the ice cream in the centre of the ice cream mass, at - 16° C. The scores thus range from "not firm, 0" to "very firm, 5" and thus gives the softness index. The softness is considered insufficient with a score of 5, when the spoon can not

20 penetrate into the ice cream; a softness of 1 to 3 is considered to meet the goal of the invention.

Shrinkage is the partial or total loss of the air incorporated in the ice cream. Shrinkage typically occurs during ice cream storage, in particular when the ice 25 cream is exposed to high temperature and/or temperature oscillation. Due to shrinkage, the ice cream volume is reduced, the shape can be affected and, over a determinate level of shrinkage, the products are unmarketable. A good resistance to shrinkage therefore is a key property of an ice cream. The capability of different products to keep their volume over commercial shelf-life, 30 i.e. to resist shrinkage can simply be compared by exposing them at room temperature and visually evaluating the changes of their appearances.

The overrun is expressed as a percentage by volume and defined as the percentage by which the volume of the liquid mix for a product is increased with air during whipping and freezing.

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Examples

Ice confections were formulated and produced according to the following processing conditions:

- 5 Vegetable fibre is mixed with some sugar or predispersed in some water at temperature of 45° C and added with all the powdery ingredients to liquid ingredients and glycerol in an agitated mixing tank.  
Once all ingredients have been thoroughly blended together, the mixture was heated at 65° C for 20 min. in order to hydrate the hydrocolloids.
- 10 For pasteurisation, the mixture was then heated to a temperature of 87° C for 24 s. to achieve satisfactory treatment to confirm public health requirements and also avoiding as much as possible any significant denaturation of proteins.  
The mixture was then subjected to an homogenisation stage to reduce the dimensions of the fat droplets, by homogenising the mixture at a pressure of 120
- 15 to 160 bar, at a temperature of 70 to 85° C. The homogenised mix was rapidly cooled to chill temperatures, typically 4° C and then aged by holding it for 4 to 12 h at that temperature.  
The mixture was frozen using ice cream continuous freezer known as scraped surface heat exchangers where it was aerated wby incorporating sufficient air to give the desired overrun. The ice confections were frozen down to draw
- 20 temperatures lower than - 6° C, typically of - 8 to - 10° C.  
After being extruded together with an aromatised sauce of 45 to 55 % sugar content, topped with inclusions (for decoration) and packed into transparent plastic cups closed with transparent lids, the products were subjected to
- 25 hardening in a hardening tunnel and stored at - 30° C.

Formulations of examples 1-4 indicated in table 1 below concern the ice creams without the sauce and inclusions.

30

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Table 1

Component	Composition %			
	Example 1	Example 2	Example 3	Example 4
Fat (cocoa fat and monodi-glyceride excluded)	6,1	5,6	5,1	14,5
Non-fat milk solids (from liquid skim milk and skim milk powder)	5,6	4,7	6,3	5,5
Whey solids	2,9	1,9	2,4	1,9
Sucrose	6,5	6,5	12	8
Corn syrup solids (DE=60, 80 % solids)	15,2	11,2	7,2	0,8
Dextrose	0,9	6,4	1,8	6,9
Locust bean gum	0,18	0,12	0,2	0,1
Guar gum	0,09	0,06	0,1	0,05
Carrageenan	0,03	0,03	0,03	0,03
Mono-diglycerides	0,2	0,2	0,2	0,4
Glycerol	2,5	3	1	5
Vegetable fibre (Inulin, Fibruline®, Cosucra)	1,9	1,4	2,9	5,8
Cocoa powder	---	5,3	---	—
Water	57,9	53,6	60,8	51
Total solids	42,1	46,4	39,2	49

5 The products of examples 1 to 4 were very soft with softness indexes of 1 to 2, in contrast to regular ice cream rating 5. Their overrun is 143-147 %. Samples of cylindrical shape were taken out of the freezer cabinet at a temperature of - 18° C and checked after 30 min. and respectively 60 min. at room temperature (24° C) for volume loss, compared to:

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Comparison 1: an ice cream with glycerol to increase softness in comparison to regular ice cream and

Comparison 2: a regular ice cream with no glycerol and no vegetable fibre.

The products of examples 1 to 4 were found to have a resistance to shrinkage comparable to comparison 2 (regular ice cream) after 30 and after 60 min. at room temperature with almost no deformation and no apparent shrinkage.

In contrast thereto, comparison 1 showed severe deformation already after 30 min. and complete deformation and loss of 1/3 to 1/2 of the volume by shrinkage after 60 min.

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**Claims**

1. Aerated frozen confection which is resistant to shrinkage and is soft up to common consumption temperature, characterized in that it comprises by weight:
  - 5 50 to 70 % water,
  - 5 to 20 % fat,
  - 1 % or more polyol,
  - 0.5 to 7 % vegetable fibre,
  - 10 the balance being sugars, milk proteins, hydrocolloids and emulsifiers and has an overrun of 20 to 200 %.
2. Aerated frozen confection according to claim 1, characterized in that it comprises 2 to 8 % by weight proteins that are predominantly coming from monopasteurized milk.
  - 15
3. Aerated frozen confection according to claim 1 or 2, characterized in that the polyol is glycerol.
  - 20
4. Aerated frozen confection according to claim 3, characterized in that the level of glycerol is 1 to 5 % by weight.
  - 25
5. Aerated frozen confection according to one of the preceding claims, characterized in that the vegetable fibers are oligosaccharides from chicory at a level of 2 to 4 % by weight.
  - 30
6. Aerated frozen confection according to one of the preceding claims, characterized in that it has an overrun of 90 to 160 %.
  - 35
7. Method for producing an aerated frozen confection as claimed in claim 1 to 6, characterized in that it comprises the steps of:
  - premixing vegetable fibre with water and adding the other powdery and liquid ingredients in an agitated mixing tank,
  - subjecting the mix to a heating step to hydrate the hydrocolloids,
  - pasteurizing the heated mix,
  - homogenizing the pasteurized mix,
  - cooling, ageing and freezing the mix whilst aerating,
  - packaging and hardening the mix.

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8. Method according to claim 7, characterized in that pasteurizing is carried out during about 24 to 30 s at about 90° C to 80°C.

9. Method according to claim 7, characterized in that homogenizing is carried out at about 60° C at a pressure of about 180 bar.

5

10. Method according to claim 7, characterized in that freezing is carried out in a scraped surface freezer at a draw temperarure of - 5 to - 10° C.

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11. The use of vegetable fibre in combination with a polyol for improving softness and stability against shrinkage of an ice confection which contans 5 to 20 % by weight fat.

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**Abstract****Frozen aerated confection and method of production**

5      Frozen aerated packaged ice confection with very high softness at - 18° C which keeps this property without shrinkage or layering up to the final consumer over the product shelf life contains polyol and vegetable fibre.

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